

175. The ~~s~~ lid according to Claim 112, where in the ~~C<sub>70</sub>~~ is present in amounts that are capable of being detected by IR.

176. The carbon product of Claim 167 or 169 wherein the ~~C<sub>60</sub>~~ is present in amounts that are capable of being detected by IR.

177. The carbon product of Claim 167 or 169 wherein the ~~C<sub>60</sub>~~ is present in amounts that are capable of being detected by UV.

178. The carbon product of Claim 167 or 169 wherein the ~~C<sub>60</sub>~~ is present in amounts sufficient to obtain X-ray diffraction pattern thereof.

179. The carbon product of Claim 168 or 170 wherein the ~~C<sub>70</sub>~~ is present in amounts sufficient to be detected by UV.

180. The carbon product of Claim 168 or 170 wherein the ~~C<sub>70</sub>~~ is present in amounts sufficient to be detected by IR.--

REMARKS

The Office Action dated August 27, 1992 rejects Claim 86 and the specification under 35 U.S.C. first paragraph for allegedly being non-enabling. Furthermore, Claim 86 is rejected under 35 U.S.C. §112, second paragraph, for allegedly failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Furthermore, Claims 45-83, 86-88 and 91-93 are rejected under 35 U.S.C. §101 for allegedly being directed to non-patentable subject matter. The Office Action also rejects Claims 45-83, 86-88 and 91-93 under 35 U.S.C. §102(b) as allegedly being anticipated by the teachings in Buseck, et al. in Science 1992, 257, 215-217. ("Buseck, et al."). Moreover, Claims 45-84, 86-89 and 91-93 are rejected under 35 U.S.C. §102(b), as allegedly being anticipated by, or in the alternative, under

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35 U.S.C. §103, as defining subject matter which is allegedly rendered obvious by the teachings in Kroto, et al. in Nature 1985, 318, 162-163 ("Kroto, et al.") and Curl, et al. in Scientific American 1991, 54-63 ("Curl, et al."). In addition, Claims 45-84, 86-89 and 91-95 are rejected under 35 U.S.C. §102(b) or, in the alternative, under 35 U.S.C. §103, as defining subject matter which is allegedly anticipated by, or in the alternative, rendered obvious by the teachings in Kirk-Othmer, Encyclopedia of Chemical Technology, 1978, 4, 652-653 ("Kirk-Othmer") in view of Gerhardt, et al., Chemical Physics Letters 1987, 137, 306-310 ("Gerhardt, et al."), an article by Howard, et al. in Nature 1991, 352, 139-141 ("Howard, et al.") and Curl, et al.

In response to the rejections, applicants have added and amended claims, which, when considered with the comments herein, is deemed to place the present case in condition for allowance. Favorable reconsideration is respectfully requested.

Applicants wish to thank Examiner Kalinchak for conferring with applicants' representative on December 16, 1992 and for the courtesy, kindness and assistance extended to applicants' representative.

Applicants have amended the product-by-process Claims 53-58 and 61, by defining that the first step in the process is vaporizing a carbon "source". Support for the term is found on Page 3, lines 28-30 of the instant specification.

Applicants have also amended Claim 96 and added additional claims, such as Claims 96-119, 113-141, 158-180 wherein it is recited that the fullerene, albeit  $C_{60}$  and  $C_{70}$ , is present in "macroscopic quantities". Support for the " $C_{60}$  being present in macroscopic quantities" permeate the specification. More specifically, the specification teaches

and discloses that the  $C_{60}$  formed and isolated by the process described herein is in quantities that can be seen. In this regard, attention is directed to Page 2, line 32, wherein the specification teaches that  $C_{60}$  is produced in "recoverable amounts", and Figure 2 wherein an X-ray diffraction pattern is taken of a product produced in accordance with the present invention. In order to obtain an X-ray diffraction pattern, as is well known to one skilled in the art, macroscopic quantities, e.g., crystals of the material, are required. The results of the X-ray pattern is given on Page 9, line 5 to Page 11, line 30 of the instant specification. Furthermore, the concept is supported by Figures 3 and 4, which are directed to IR and UV of the same product, respectively. As is known to one skilled in the art, macroscopic quantities of material are required to take IR and UV. In addition, attention is directed to Page 11, line 30 of the instant specification wherein it is indicated that the IR spectrum is taken of an approximately two micrometer thick  $C_{60}$  coating on a silicon substrate. Additionally, attention is directed to page 6, lines 6-21 of the instant specification wherein the text describes the procedure for separating the  $C_{60}$  from the soot and isolating it so as to obtain a crystalline product. By definition, if the product is seen as crystalline, it means that it is present in macroscopic quantities. Finally, attention is directed to Example 1 of the instant specification wherein the color of the product produced therefrom is indicated. Obviously, one cannot determine color unless it is present in sufficient amounts, i.e., macroscopic amounts. Thus, there is more than adequate support for the term "macroscopic amounts" of  $C_{60}$  in the specification.

Support can also be found in the present specification that the  $C_{70}$  is produced in macroscopic amounts,

i.e., sufficient amounts to be seen. For example, attention is directed to Page 14, lines 7-11 and Page 15, lines 1-10 of the instant specification wherein it is described how to make C<sub>70</sub> in isolatable amounts. Various techniques for detecting the C<sub>70</sub>, such as UV and IR, are described on Page 13, lines 16-25 and Page 12, lines 18-27 of the instant specification.

Therefore, the specification provides ample support for the use of the term "macroscopic amounts" in the claims.

In re Robins, 429 F.2d 452, 166 USPQ 550 (CCPA 1970).

To further underscore the isolation of C<sub>60</sub> in macroscopic amounts, applicants have recited in the claims various techniques used and described in the specification to detect the C<sub>60</sub> being produced. These techniques include, e.g. IR, UV, X-ray and micrographs of C<sub>60</sub>. Support can be found in Figures 3, 4, 2 and 1, respectively.

Similarly, to underscore macroscopic amounts of C<sub>70</sub>, claims have been added directed to various techniques used to isolate C<sub>70</sub> such as for example, UV and IR. The techniques for detecting C<sub>70</sub> produced in macroscopic amounts, such as UV or IR, are described on Page 13, lines 16-25 and Page 12, lines 18-27 of the instant specification.

Claims 113-132 are directed to a sooty carbon product. Support for the subject matter therein is found on Page 2, lines 18-24; Page 3, line 28 to Page 5, line 16, Page 6 line 23 to Page 7, line 10 and Example 1 of the instant specification. As described hereinabove, these claims also recite that the soot contains C<sub>60</sub> molecules in sufficient concentration to allow macroscopic amounts of said C<sub>60</sub> to be separated from said soot. Additionally, the claims also recite that C<sub>70</sub> may additionally be present, and in an embodiment, the C<sub>70</sub> is present in sufficient concentrations to allow macroscopic amounts of said C<sub>70</sub> to be separated from

is described in the previous paragraphs hereinabove and is incorporated herein by reference.

Claims 141-164 are directed to a solid product prepared by the process similar to the method recited in Claim 53, except that instead of extracting the fullerene from the soot, the fullerene is sublimed from the sooty carbon product. Support for the last step is described on Page 7, lines 10-25 of the instant specification.

The above analysis highlights the support for some of the claims that were amended and/or added to the application. For the convenience of the Examiner, applicants have tabulated hereinbelow where support can be found for the amended and added claims:

CLAIM NUMBER	SUPPORT
53	Page 3, lines 27-31
54	Page 3, lines 27-31
55	Page 3, lines 27-31
56	Page 3, lines 27-31
57	Page 3, lines 27-31
58	Page 3, lines 27-31
61	Page 3, lines 27-31
86	For "macroscopic amounts", see discussion hereinabove
96	For "macroscopic amounts", see discussion hereinabove
97	Figure 3
98	Figure 4
99	Figure 2
100	Page 13, lines 18-26
101	Page 12, lines 11-27
102	Figure 1, for "macroscopic amounts" see discussion hereinabove
103	Page 13, line 13, line 24 to Page 14, line 29, for "macroscopic amounts" see discussion hereinabove

104	Claim 30, for "macroscopic amounts", see discussion hereinabove
105	Claim 31, for "macroscopic amounts", see discussion hereinabove
106	Claim 23, for "macroscopic amounts", see discussion hereinabove
107	Claim 25, for "macroscopic amounts", see discussion hereinabove
108	For "macroscopic amounts" see discussion hereinabove
109	Figure 3
110	Figure 4
111	Claim 14, for "macroscopic amounts" see discussion hereinabove
112	Claim 28, for "macroscopic amounts" see discussion hereinabove
113	Page 2, line 18-24; Page 3, line 28 to Page 5, line 16; Page 6, line 23 to Page 7, line 10; Example 1; for "macroscopic amounts", see discussion hereinabove
114	Page 2, lines 18-24; Page 3, line 28 to Page 5; line 16, Page 6, line 23 to Page 7, line 10; Example 1; for "macroscopic amounts", see discussion hereinabove
115	Figure 3
116	Page 12, lines 11-27
117	Figure 4
118	Page 13, lines 18-26
119	Page 2, lines 18-24; Page 3, line 28 to Page 5, line 16, Page 6, line 23 to Page 7, line 10; Example 1, for "macroscopic amounts", see discussion hereinabove
120	Figure 3
121	Figure 4
122	Page 6, lines 9-21
123	Page 6, lines 9-21
124	Page 3, lines 28-31

125	Pag 6, lines 23-25
126	Page 6, lines 23-25
127	Page 6, lines 26-30
128	Page 6, lines 26-30
129	Page 4, lines 11-15
130	Claim 8
131	Page 3, lines 25-35
132	Claim 9
133	Figure 1
134	Figure 1
135	Figure 3
136	Figure 4
137	Figure 2
138	Figure 1
139	Page 13, lines 18-26
140	Page 12, lines 11-27
141	Page 2, lines 18-24; Page 2, line 28 to Page 5, line 16; Page 6 line 23 to Page 7, line 25
142	Page 7, lines 15-18
143	Page 7, lines 15-18
144	Page 6, lines 22-31
145	Page 6, lines 22-31
146	Page 4, lines 1-4
147	Page 4, lines 1-4
148	Page 4, lines 1-10; Page 6, line 23 to Page 7, line 10
149	Page 16, lines 1-9
150	Page 4, lines 11-15
151	Claim 9
152	Claim 10
153	Page 5, lines 6-13
154	Page 4, lines 11-15
155	Page 6, lines 9-21
156	Page 13, line 32 to Page 14, line 12
157	Page 15, lines 1-10
158	Page 3, lines 27-30
159	Figure 4

160	Figure 2
161	Figure 1
162	For "macroscopic amounts", see discussion above
163	Page 13, lines 18-26
164	Page 14, lines 11-27
165	Claim 14; Page 8, line 6 to Page 11, line 26, Figure 1; Figure 2; Page 14, lines 14-28, for "macroscopic amounts", see discussion hereinabove
166	Claim 28; Page 14, lines 14-28, for "macroscopic amounts", see discussion hereinabove
167	Claim 15; Page 14, lines 14-28; Page 8, line 6-Page 11, line 16; for "macroscopic amounts", see discussion hereinabove
168	Claim 28, Page 14, lines 14-28; for "macroscopic amounts", see discussion above
169	Claim 15, Page 14, lines 14-28; Page 8, line 6-Page 11, line 16
170	Claim 28; Page 14, lines 14-28
171	Figure 3
172	Figure 4
173	Figure 2
174	Page 13, lines 18-26
175	Page 12, lines 11-27
176	Figure 3
177	Figure 4
178	Figure 2
179	Page 13, lines 18-26
180	Page 12, lines 11-27

Thus, there is adequate support in the specification for the amendments to the claims and for the added claims, and no new matter has been added.

In response to the rejections of Claim 86, under 35 U.S.C. §112, first and second paragraphs, Claim 86 has been amended to recite that C<sub>60</sub> is present in "macroscopic amounts". As indicated in the discussions hereinabove, there is ample support for said language. Furthermore, said amendment to Claim 86 is in conformity with the Examiner's suggestion at the interview. Therefore, in view of the amendment to Claim 86, the rejection thereof under 35 U.S.C. §112, first and second paragraphs is obviated, and withdrawal thereof is respectfully requested.

In support of the rejection of Claims 45-83, 86-88 and 91-93, the Office Action cites Buseck, et al.

Buseck, et al. is an article written in 1992. They allege therein that they have found C<sub>60</sub> and C<sub>70</sub> fullerenes in a carbon rich Precambrian rock ("shungite") from Russia. The article alleges that these fullerenes are present in "minor amounts" and are unevenly distributed. According to the article, any C<sub>60</sub> or C<sub>70</sub> therein was found randomly distributed in the rock and when present, occur only within fracture-filling films in shungite. Moreover, the article further alleges that the amount of fullerenes present is so small that they could only be detected by high resolution transmission electron microscopy. Furthermore, the article admits that the C<sub>60</sub> and the C<sub>70</sub> in these regions could not have been identified if it weren't for the fact that C<sub>60</sub> and C<sub>70</sub> were known at the time of their alleged discovery, citing work performed by the present inventors, which was published subsequent to the effective filing date of the present application. See page 215.

Contrary to the allegations in the Office Action, the claimed subject matter is not found in nature, as defined under 35 U.S.C. §101. As quoted in the Office Action and stated by the Commissioner of Patents and Trademarks in the Official Gazette, 1077 OG 24 (1987):

An article of manufacture or composition of matter occurring in nature will not be considered patentable unless given a new form, quality, properties or combination not present in the original article existing in nature in accordance with existing law...

Applicants respectfully submit that the presently claimed subject matter is patentable because it complies with the requirement of 35 U.S.C. §101. It is new and useful.

Assuming that the C<sub>60</sub> and C<sub>70</sub> are present in the shungite, the facts herein establish that the present claims have all of the novelty and utility requirement for patentability under 35 U.S.C. §101. The present invention takes on a new form, qualities, properties, or combination thereof that were not present in Buseck, et al. or heretofore. The fact is that the C<sub>60</sub> and C<sub>70</sub>, if present in the shungite, are only present in very small amounts that has no practical significance. C<sub>60</sub> and C<sub>70</sub> were not found isolated from the shungite, but were integrated as part of the rock. The C<sub>60</sub> and C<sub>70</sub>, if present, was unavailable to the public and could not be utilized or appreciated in any way. If present in the shungite, the C<sub>60</sub> and C<sub>70</sub> were completely useless. The properties of C<sub>60</sub> and C<sub>70</sub> could not be ascertained. In fact, if it weren't for the discovery of the present invention, the alleged presence of C<sub>60</sub> and C<sub>70</sub> in the shungite would have gone unnoticed.

On the other hand, the present invention is far removed from the C<sub>60</sub> and C<sub>70</sub> in the shungite. The present inventors have found a means of making C<sub>60</sub> and C<sub>70</sub> publicly

available. The properties of the  $C_{60}$  and  $C_{70}$  would remain a mystery if it weren't for the present discovery. The present inventors have made  $C_{60}$  and  $C_{70}$  in a form that was never available heretofore: in a solid; in a form that was isolatable; in an amount that was free from non-fullerene particles; in a purer concentration; in macroscopic amounts; and the  $C_{60}$  and  $C_{70}$  are produced in such quantities that the public can work with them and utilize them.

Furthermore, the discovery of  $C_{60}$  and  $C_{70}$  by the present invention revolutionized science. As indicated in Curl, et al., they searched for five years in search of providing means of generating "visible amounts of  $C_{60}$ ", but their attempts were unsuccessful. However, the discovery of  $C_{60}$  and  $C_{70}$  by the present inventors have fulfilled a long felt need. The present invention spawned an enormous amount of research in this area that has not been seen in recent times. Thousands upon thousands of articles have been written on the subject as a result of the present invention.

Thus, the discovery of  $C_{60}$  and  $C_{70}$  by the present inventors has become for every practical purpose, a new thing, a new form. The present discovery has transformed something completely useless into something useful.

The present situation is not unlike the situation in Pfizer and Co., Inc. v. Barry-Martin Pharmaceuticals, 145 USPQ 29 (S.D. Fla. 1965). The patent in suit was owned by the plaintiffs and was directed to tetracycline and its salts and process for the production thereof. Even though it was known by the scientific community that insignificant amounts of tetracycline were co-produced with a process for producing another drug, the court held that the prior existence of tetracycline in trace amounts did not invalidate the patent.

Id.

Although the above arguments are applicable to all of the claims, they are particularly applicable to the claims directed to C<sub>60</sub> and C<sub>70</sub> in macroscopic amounts, substantially pure C<sub>60</sub> and C<sub>70</sub> and the product by process claims directed to the production of C<sub>60</sub> and C<sub>70</sub>; and C<sub>60</sub> and C<sub>70</sub> as solids. Unlike any C<sub>60</sub> and C<sub>70</sub> that may have been present in the shungite, the amount of C<sub>60</sub> and C<sub>70</sub> present is in macroscopic quantities or are relatively pure. The C<sub>60</sub> and C<sub>70</sub> present in the shungite could not achieve these forms. As indicated heretofore they were only available in trace amounts, and were always present as part of the shungite and never isolated therefrom. Consequently, these forms of C<sub>60</sub> and C<sub>70</sub> are new relative to that described in Buseck, et al.

Consequently, in conclusion, applicants submit that until the present inventors produced them there was no such thing as C<sub>60</sub> or C<sub>70</sub> in solid forms as obtained by the product by process claims or the claims directed to the solids. There was no such thing as C<sub>60</sub> and C<sub>70</sub> that could be detected in anything other than trace amounts. No macroscopic quantities of C<sub>60</sub> or C<sub>70</sub> could be obtained until the present inventors developed the methodology. No one could produce or isolate any C<sub>60</sub> or C<sub>70</sub> product that was relatively pure, as presently claimed. If it weren't for the discoveries of the present inventors, C<sub>60</sub> and C<sub>70</sub> would have remained unidentified and unknown. The products prepared by the present invention had advantageous characteristics which before could never been realized. For years, scientists have been attempting to make these products in macroscopic amounts, but were unsuccessful until the present inventors developed a means. Their discovery filled a long felt want and went into immediate use, spawning a great deal of research. These criteria are factors that support patentability and compliance with 35 U.S.C. §101.

See Merck & Co. Inc. v. Olin Matheieson Chemical Corp., 254 F.2d 156 (4th Cir. 1957).

Therefore, the present inventors have produced products that are indisputably beneficial to mankind -- something new in a useful art which the patent policy was intended to promote.

Therefore, the rejection of the claims under 35 U.S.C. §101, for allegedly being directed to a natural product is overcome, and withdrawal thereof is respectfully requested.

The Office Action rejects Claims 45-95 under 35 U.S.C. §101 for allegedly lacking patentable utility. In other words, the Office Action questions the utilities ascribed to the products described in the specification. However, the Office Action has failed to cite any reference or teaching that refutes the utility ascribed to the products in the instant specification.

The position taken in the Office Action is contrary to case law. Where there is doubt expressed as to the truth or plausibility of allegations in a patent application, it is incumbent upon the Patent and Trademark Office to refute these statements. In re Sichert, 566 F.2d 1154, 196 USPQ 209 (CCPA 1977), In re Marzoichi, 439 F.2d 220, 169 USPQ 367 (CCPA 1971). The Patent and Trademark Office must explain why it doubts the truth or accuracy of any statement in the disclosure and to substantiate its assertions with acceptable evidence or reasoning which is inconsistent with the contested statement. In re Sichert. In fact, only when the Patent Office has adequate support for its challenge of the credibility of applicant's statement as to utility does the burden shift back to the applicant to provide rebuttal evidence; otherwise there would be no need for the applicant to support his presumptively adequate disclosure. Id.

However, the Office Action has failed to provide any such evidence supporting the position that the present compounds do not have the alleged utility. The Office Action just makes conclusions. It fails to provide any reference or any teaching which contradicts any of the statements in the present application. Therefore, the applicant submits that the Office Action has not made out a prima facie case and consequently, the burden has not shifted to the applicant to provide rebuttal evidence. Id.

However, in order to advance the present prosecution, the applicants are presenting evidence herewith supporting one of the utilities listed in the application, i.e., that the C<sub>60</sub> and C<sub>70</sub> are both useful as paint pigments. To this end, attention is directed to the enclosed paintings by Dr. Donald Huffman, one of the inventors, who painted two pictures with a solution of C<sub>60</sub> and/or C<sub>70</sub>. As indicated in the attached Declaration, the dried C<sub>60</sub> is yellow-to-brown in color and the C<sub>70</sub> gives the faintly purplish hue in the two paintings. Inasmuch as applicants have provided adequate support of one of the utilities ascribed to the compounds in the specification, the requisite utility order 35 U.S.C. §101 has been satisfied.

Furthermore, attention is directed to U.S. Patent No. 5,114,477 to Mort, et al. For the convenience of the Examiner, a copy is enclosed. Mort, et al. are directed to an ink composition containing fullerenes as a colorant. This is a utility consistent with that alleged by the present specification.

Therefore, the rejection of Claims 45-95 under 35 U.S.C. §101, for allegedly lacking utility is overcome, and withdrawal thereof is respectfully requested.

Pursuant to the rejection of Claims 45-83, 86-88 and 91-93 under 35 U.S.C. §102(b), the Office Action cites the natural deposit to shungite found in Russia and reported in Buseck, et al.

Applicants submit that this is not a proper rejection under 35 U.S.C. §102(b). 35 U.S.C. §102(b) states:

A person shall be entitled to a patent unless:

(b) the invention was patented or described in a printed publication in this or a foreign country or in the public use or sale in this country, more than one year prior to the date of the application for patent in the United States...

Assuming that the shungite deposit was found in Russia, it was not described in a printed publication more than one year prior to the filing date of the present application. In fact, the article was published after the filing date of the instant specification, a fact that is acknowledged in the Office Action. Therefore, the invention was not patented or described in a printed publication in this or a foreign country more than one year prior to the filing date of the instant specification.

Furthermore, as indicated in the Office Action, the shungite was found solely in Russia, and not in the U.S. Thus, based on the teachings therein, the shungite containing C<sub>60</sub> and C<sub>70</sub> were not in public use or sale in this country at any time and especially not more than one year prior to the filing date of the present application.

Thus, the facts applied in the Office Action do not meet the criteria of 35 U.S.C. §102(b). Therefore, the rejection of Claims 45-83, 86-88 and 91-93 is obviated and withdrawal thereof is respectfully requested.

The Office Action rejects Claims 45-84, 86-99 and 91-93 under 35 U.S.C. §102(b) or in the alternative under 35 U.S.C. §103 as allegedly being anticipated or, in th

alternative, as allegedly rendered obvious by Kroto, et al. with Curl, et al. being cited to show an allegedly inherent state of fact.

The present invention is directed to various embodiments of C<sub>60</sub> and C<sub>70</sub>. For example, it is directed to C<sub>60</sub>, C<sub>70</sub>, substantially pure C<sub>60</sub>, substantially pure C<sub>70</sub>, solid C<sub>60</sub>, solid C<sub>70</sub>, crystalline C<sub>60</sub>, crystalline C<sub>70</sub>, C<sub>60</sub> in appreciable amounts, combinations thereof and products (or solids) containing C<sub>60</sub> and C<sub>70</sub> solids, crystals, etc.

The Kroto et al., article describes the following experiment. A solid disk of graphite was vaporized into a high-density helium flow using a focused pulsed laser. The resulting vaporized carbon was expanded in a supersonic molecular beam and photoionized using an excimer laser, thereby forming molecular ions. The molecular ions, not the molecule, were detected by the time of flight mass spectrometry.

Applicants respectfully submit that the Kroto, et al. article is non-enabling.

To be enabling, a reference must describe an invention sufficiently to have placed the public in possession of it. In re Donahue, 766 F.2d 531, 226, USPQ 619 (Fed. Cir. 1985). The printed publication must be enabling. Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 7 USPQ 21 1057 (Fed. Cir. 1988). The test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosure in the reference coupled with the information known to one skilled in the art without undue experimentation. United States v. Teletronics, Inc., 857 F.2d 778, 775 8 USPQ 21 1217 (Fed. Cir. 1988), cert. denied 109 S.Ct. 1954 (1989).

But, the public was not possessed of a method of preparing, isolating, and collecting C<sub>60</sub> and C<sub>70</sub>, especially a C<sub>60</sub> or C<sub>70</sub> in the solid state. Based on the teachings by Kroto, et al., people skilled in the art were unsuccessful in preparing macroscopic quantities of C<sub>60</sub> or C<sub>70</sub>. Despite extensive efforts, no solid of C<sub>60</sub> or C<sub>70</sub> could be made or isolated until these were prepared and isolated by the present inventors. Furthermore, despite the extensive efforts, no crystalline C<sub>60</sub> or C<sub>70</sub> was ever prepared and isolated until the advent of the present inventors. Further, no material containing solids comprising C<sub>60</sub> and/or C<sub>70</sub> were made until the present inventors developed the methodology. Thus, Kroto, et al. did not place the public in possession of the applicants' invention.

It is well settled that prior art under 35 U.S.C. §102(b) must sufficiently describe the claimed invention to have placed the public in possession of it.... Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his own knowledge to make the claimed invention. Accordingly, even if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling... In re Donahue, 766 F.2d 531, 533, 226 USPQ 619, 621 (Fed. Cir. 1985).

Moreover, the Court continues that if the reference teaches that attempts to make the invention failed, as in the present case, the reference is non-enabling:

...In those cases, the references were deemed insufficient because they stated that attempts to prepare the claimed compounds were unsuccessful. Such failures by those skilled in the art (having possession of the information disclosed by the publication) are strong evidence that the disclosure of the publication was non-enabling. Id.

Furthermore, there is additional evidence that Kroto, et al. did not produce the C<sub>60</sub> of the present invention. If C<sub>60</sub> were

present in the soot, then when slurried with benzene, they would have obtained a colored solution, as in the present case. But, when they slurried the soot with benzene, they were always unsuccessful in obtaining a colored solution. See Curl, et al. p55.

Furthermore, they were completely unsuccessful in making, isolating and collecting C<sub>60</sub> and C<sub>70</sub>. They only had indirect evidence of what it is that they made. They never made solid C<sub>60</sub> and C<sub>70</sub>. They never made or isolated a crystalline form of C<sub>60</sub> and C<sub>70</sub>. Whatever they made, they only made it in non-measurable amounts. At best, they could only make molecules of something, only tens of thousands of molecules, which they could not touch, see or smell. No matter how much they tried, they were always unsuccessful in making more. They could never make enough material to put it in the possession of the public:

Thus, for five years, we had been searching for a method of producing visible amounts of the stuff. We called our efforts "the search for the vial" because quantum calculations for such a soccer ball shaped carbon molecule suggested it would absorb light strongly only in the far violet of the spectrum....  
Curl, et al. at 55.

Contrary to the allegations the Official Action, Kroto, et al. does not make C<sub>60</sub> or place the public in possession thereof. Furthermore, even if the public were in possession of C<sub>60</sub> and C<sub>70</sub>, Kroto, et al. fail to teach one skilled in the art how to use the C<sub>60</sub> and C<sub>70</sub>. Inasmuch as the Kroto, et al. is non-enabling, it is improper for it to be cited in support of the rejection, under 35 U.S.C §§102 or 103.

Furthermore, it is noted that the Curl, et al. article is published subsequent to the filing date of the present application. The comments of Curl, et al. had the

benefit of the publication of Huffman, et al. regarding the production and isolation of  $C_{60}$ . Thus, any statement in Curl, et al. commenting on Kroto, et al. was made with information obtained after the filing date of the present invention. Consequently, it is improper to cite Curl, et al. to support a proposition in Kroto, et al. for it is reflective of the newly gathered information which was not available when Kroto, et al. were written.

Furthermore, even if Kroto, et al. is enabling, it does not teach, disclose or even suggest the present invention. Assuming, pro arguendo, that Kroto, et al. teach the preparation of a  $C_{60}$  (or  $C_{70}$ ), it was never formed in appreciable amounts. They never prepared solid or crystalline  $C_{60}$  or  $C_{70}$ , as presently claimed. It was not possible to prepare the solid or, for that matter,  $C_{60}$  or  $C_{70}$ , in any appreciable amounts, without undue experimentation. As stated in Curl et al., despite extensive efforts by the scientific community, no one was successful in preparing  $C_{60}$  or  $C_{70}$  in any appreciable amounts. Consequently, Kroto, et al., do not teach, disclose or even suggest solid  $C_{60}$ , or solid  $C_{70}$ , crystalline  $C_{60}$ , crystalline  $C_{70}$ , solids consisting essentially of  $C_{60}$ ,  $C_{70}$ , etc., or any matter coated with solid  $C_{60}$  or  $C_{70}$  as presently claimed. Furthermore, contrary to the allegations of the Office Action, there is direct evidence that the material produced by Kroto, et al., is different from that produced by the present invention. When Kroto, et al., collected the sooty carbon produced by the vaporization laser, and slurried the soot in benzene they did not obtain colored solution, which they should have, if  $C_{60}$  were present. On the contrary, they obtained a clear solution. See Curl, et al., p55. On the other hand, the present inventors obtained a colored solution when benzene was added to their soot. See

Example 1. Thus, the material obtained by Kroto, et al., was different from that obtained by the process of the present invention. Therefore, for the reasons given herein, the claimed invention is not anticipated or rendered obvious by Kroto, et al. Consequently, the rejection of the claims under 35 U.S.C. §§102 and 103 is overcome and withdrawal therefore is respectfully requested.

In support of its rejection of Claims 14-25, 27-31 and 33-36, the Examiner cites Kirk-Othmer in view of Gerhardt, et al., Howard, et al. and Curl, et al.

Kirk-Othmer discloses the preparation of acetylene black and channel black. Acetylene black is prepared by burning acetylene and air to heat the metal retorts to reaction temperature, followed by shutting off the air supply to allow the acetylene to decompose to carbon and hydrogen in the absence of air. The high carbon concentration, high reaction time and relatively long residence time produce this channel irons whose flat side was used to collect carbon black deposited from many small flames in contact with its surface.

Kirk-Othmer does not teach, disclose or even suggest  $C_{60}$  and  $C_{70}$ ; it doesn't even contemplate or discuss  $C_{60}$  or  $C_{70}$ . Consequently, Kirk-Othmer does not anticipate or render obvious the present invention. The Examiner appears to cite Gerhardt, et al., Howard, et al. and Curl, et al. to show that  $C_{60}$  and  $C_{70}$  fullerenes are inherently produced in the carbon black processes described by Kirk-Othmer.

But this fact is repudiated by the teachings in an article by Malhotra, et al. J. Phys. Chem., 1991, 4599-4601 ("Malhotra, et al.") which clearly establishes the relative absence of fullerenes in carbon black. The processes described in Kirk-Othmer are either classified as combustion with respect to the channel black process or thermal

decomposition (pyrolysis) with respect to the acetylene black process. However, Malhotra, et al. teach the virtual absence of fullerenes in common soots, such as carbon black or acetylene black produced by pyrolysis or combustion.

Therefore, contrary to the allegations in the Office Action, there is no inherent C<sub>60</sub> and C<sub>70</sub> in the carbon black described in Kirk-Othmer. Therefore, Gerhardt, et al., Curl, et al. and Howard, et al. do not show a fact inherently present in Kirk-Othmer.

Thus, for the reasons given hereinabove, the rejection of the claims under 35 U.S.C. §102 or in the alternative under 35 U.S.C. §103 as defining subject matter which is allegedly anticipated or rendered obvious by Kirk-Othmer is overcome and withdrawal thereof is respectfully requested.

Applicants note that the Examiner did not make of record the references cited in the Information Disclosure Statement dated on June 24, 1992. Although the Information Disclosure Statement was filed subsequent to the issuance of an Official Action on the merits, applicants authorized the payment of the requisite fee with the submission of the Information Disclosure Statement. Furthermore, in the Information Disclosure Statement the majority of the references were in English and for the non-English reference, the relevance was described therein. Thus, the Information Disclosure Statement was filed in compliance with 37 C.F.R. §31.97 and 1.98. Therefore consideration thereof is respectfully requested.

Therefore, in view of the Amendments to the claims and the Remarks hereinabove and the Declaration, it is respectfully requested that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

  
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